

Application No. 10/748,014
Docket No. 2003U043.US
Response to Office Action dated November 2, 2006

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REMARKS

Please reconsider the application in view of the above amendments and the following remarks.

Claims 38-63 are pending in this application. Claims 1-37, previously withdrawn due to a restriction requirement, are canceled.

Applicant has canceled claims 1-37, amended claims 38, 48, 49, 50, 51, 53, 56, and 60, and added new claims 64 and 65. Claim 38 has been amended to indicate that the catalyst includes a first and second catalyst compound; support for this amendment can be found, for example, in the specification at paragraphs [0037]-[0069]. Claims 48 and 53 are amended to maintain antecedent support. Claim 50 has been amended to correct a typographical error. Claim 56 has been amended to delete "additionally-discovered catalyst compound." Claim 60 has been amended to depend from claim 38 and to refer to various "methylalumoxane-activatable compounds" as opposed to "additionally-discovered catalyst compounds"; support for this amendment can be found, for example, in the specification at paragraphs [0090]-[0095] and in the claims as originally filed.

Claim 51 has been rewritten to be in independent format and to maintain antecedent support. Amended claim 51 incorporates features of claims 38 and 48. Claim 49 was amended to correct a typographical error.

Support for the new claims 64 and 65 can be found, for example, on pages 23-25 of the specification.

By this amendment, Applicant has amended specification paragraph [0019] to cancel the purported new matter introduced by the previous amendment filed August 10, 2006.

Applicant respectfully submits that no new matter has been introduced by these amendments. These amendments do not constitute a surrender of subject matter, as the original claims may be pursued in a continuation.

Rejections under 35 U.S.C. § 112, Second Paragraph

Claims 38-63 were rejected as indefinite under 35 U.S.C. § 112, second paragraph. Specifically, the intended scope of claim 38 was unclear due to the use of "catalyst

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component” where the specification defined “catalyst compound.” Claim 56 was rejected as indefinite under 35 U.S.C. § 112, second paragraph, as the scope of “additionally-discovered catalyst compound” could not be determined.

With regard to the rejection of claim 38, as amended, claim 38 requires a “first catalyst compound” and a “second catalyst compound,” wherein the first and second catalyst compounds are supported on a common support. As claim 38 now specifically requires catalyst compounds, the scope of claim 38 is readily ascertainable. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 38 under 35 U.S.C. § 112, second paragraph.

With regard to the rejection of claim 56, as amended, claims 56 no longer refers to “additionally-discovered catalyst compounds” and claim 60 refers to specific catalyst compounds described in the specification at paragraphs [0090]-[0095] following the caption “Additionally-Discovered Catalyst Compounds.” As “additionally-discovered catalyst compounds” are no longer referenced in the claims, the scope of claims 56 and 60 are readily ascertainable. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 56 under 35 U.S.C. § 112, second paragraph.

Rejections under 35 U.S.C. § 102(b)

Claims 38-50 and 52-63 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,214,949 issued to Reddy *et al* (“Reddy”). To the extent that the rejection still applies to the claims as amended, Applicant respectfully disagrees.

Reddy discloses, in one embodiment, the use of a catalyst system comprising a conventional supported Ziegler-Natta transition metal catalyst, one or more (unsupported) metallocene compounds, and an electron-donor/co-catalyst, for the polymerization of olefins. Reddy further relates the formation of the catalyst system by a) selecting a conventional supported Ziegler-Natta catalyst component and b) contacting the catalyst with at least one soluble metallocene compound, among other steps (column 2, lines 33 to column 4, line 25). However, nowhere in the reference does Reddy disclose the support of a first catalyst compound, and a second catalyst compound on a *common support*, and treatment of the resultant supported bimetallic catalyst system with at least one methylalumoxane-activatable compound.

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Regarding claim 38, claim 38 recites, a supported, treated catalyst system produced by a process comprising the steps of (a) forming a supported bimetallic catalyst system comprising a first catalyst compound and a second catalyst compound, where both the first and second catalyst compounds are supported on a common support material; and (b) contacting the supported bimetallic catalyst system with a methylalumoxane-activatable compound.

The Action asserts that, in Reddy, contact of the supported Ziegler-Natta catalyst with the metallocene would necessarily result in at least some of the metallocene becoming deposited on the surface of the supported Ziegler-Natta catalyst, because the deposition of metallocenes on supported Ziegler-Natta catalysts is commonly known in the art. This assertion is respectfully traversed.

Under Federal Circuit precedent, a rejection under 35 U.S.C. § 102 is improper when the cited reference does not contain each and every element of the rejected claim. *See Brown v. 3M*, 265 F.3d 1349, 1351 (Fed. Cir. 2001). Established case law allows an Examiner to rely on any of express, implicit, and inherent disclosures in rejecting claims under § 102 or § 103; however, to properly rely upon the theory of inherency, "the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). The burden then shifts to the Applicant to prove that the prior art does not necessarily possess the characteristics of the claimed invention. *In re Fitzgerald*, 205 USPQ 594 (CCPA 1980).

In response to the Examiner's previous assertion that deposition of metallocenes on supported Ziegler-Natta catalysts is commonly known in the art, Applicant respectfully asserts that even though it is known that a non-zero amount of metallocenes *may* adsorb to the surface of the supported catalysts, the Examiner has no basis in fact and/or technical reasoning to reasonably support the determination that the metallocene *necessarily* adsorbed onto the surface of the supported Ziegler-Natta catalyst to produce a supported bimetallic catalyst under the conditions recited by Reddy.

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The fact that a certain result or characteristic *may* occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (citing *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981)). Rather, “[t]o establish inherency, the extrinsic evidence ‘*must make clear* that the missing descriptive matter is *necessarily present* in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (emphasis added).

In the Examiner’s prior assertions that Reddy must inherently possess the supported metallocene, the Examiner fails to recognize that the present inventor has found a novel composition to solve the problems currently present in the industry.

Applicant respectfully notes that the mere combining of a supported heterogeneous catalyst and an unsupported homogeneous catalyst in the polymerization mixture does not *necessarily* result in absorption or deposition of an appreciable amount of the unsupported catalyst on the support. Rather, heterogenization studies indicate that a simple and physical mixing of metallocenes with a support does not give rise to the formation of a practical catalyst system mainly due to the small *amount* of metallocenes that actually adsorbs on the support. The preassembly of the supported, treated catalyst system as recited by the Applicant advantageously allows for quantification of the amount of metallocene, as well as the total amount of transition metal, available on the support for polymerization (see individual transition metal and total transition metal loading (TM) calculated in the Examples).

Furthermore, Applicant respectfully points out that even if some metallocene does adsorb to the surface of the Ziegler-Natta catalyst as suggested by the Examiner, the orientation, activity, or distribution of any adsorbed species is uncertain. Adsorption may occur chemically via dehydrohalogenation of the metallocene by any hydroxyl groups (as disclosed in one embodiment by Reddy) presented at the surface of the support. A chemically anchored metallocene may not be activatable by methylalumoxane due to steric or even electronic considerations, thereby poisoning or rendering inoperable that component of

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the claimed catalyst system. Further, the hydrochloric acid byproduct necessarily produced by this dehydrohalogenation in a "one-pot" catalyst system as taught by Reddy, can also translate into loss of activity.

In addition, depending on the amount of conventional Ziegler-Natta catalyst found on the support, the surface functionalities presented by the Ziegler-Natta catalyst can sterically restrict access to any unreacted functional groups present on the support, either on the surface or in the pores, thereby preventing adsorption of metallocene catalyst. Reddy also requires the addition of an external electron donor or selectivity control agent which is known in the art to overcome the inherent poor stereochemical control of its $\text{MgCl}_2/\text{TiCl}_4$ catalyst system. It has been proposed that the electron donor participates in the formation of a complex with the active site of the Ziegler-Natta catalyst through the aluminum trialkyl co-catalyst, which stabilizes the active center of the supported catalyst. The formation of such complexes necessarily sterically restricts the availability of reactive surface moieties for support of metallocenes. In conclusion, even if some metallocene does adsorb onto the surface of the catalyst system disclosed by Reddy, as suggested by the Examiner, the loading of the metallocene would be necessarily low, the species presented on the surface may not be activatable by methylalumoxane, and there would be no control over the loading or distribution of the metallocene on the chosen support.

At column 5, lines 25-27, and at column 7, line 63 to column 8, line 3, Reddy discloses its invention as a combination of two particular types of catalysts. Specifically, Reddy requires that its catalyst system have a heterogeneous catalyst, an unbridged metallocene catalyst, and optionally, a bridged metallocene. Furthermore, in the examples, Reddy merely indicates formation of its catalyst system by charging a steel cylinder with a conventional supported Ziegler-Natta catalyst and an unsupported metallocene catalyst in addition to other reactants for a timed prepolymerization of five seconds, and then transferring the mixture to a reactor (see Reddy, Example 1 and Example 25). Applicant respectfully notes that this does not teach support of the metallocene catalyst. Rather, Reddy merely discloses the use of a mixture of catalyst components, both homogeneous and heterogeneous, and does not distinctly teach, explicitly or inherently, the assembly of a first and second catalyst compounds on a common support, as required by claim 38. A claim is anticipated only if each and every element as set forth in the claim is found in a single prior

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art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628 (Fed. Cir. 1987); MPEP 2131.

The supported, treated catalyst system as claimed by the Applicant further provides several distinct advantages over the catalyst system as disclosed by Reddy. The supported, treated catalyst system claims a *wholly* supported active metallocene-containing catalyst for polymerization which is industrially advantageous. Coordination catalysts such as metallocenes are ideally suited for the industrial production of polyolefins by slurry-phase and gas-phase polymerizations. Industrial reactors for these types of polymerizations are typically outfitted for the use of supported catalysts such as supported Ziegler-Natta catalysts. In order to add solutions of metallocenes (as indicated in the examples by Reddy), considerable expense would have to be expended to retrofit existing reactors or to build new ones. Furthermore, solutions of metallocenes tend to degrade under conditions of high temperature and high pressure. The supported, treated catalyst system claimed herein would allow advantageous industrial use of metallocenes in slurry-phase and gas-phase polymerizations of polyolefins using currently available infrastructure and currently used reaction conditions of high temperature and pressure.

Moreover, wholly supported catalysts such as the claimed supported, treated catalyst system serve as a template for the growing polymer, allowing for stable, controlled, polymer chain extension. Catalyst mixtures, such as disclosed by Reddy, with a homogenous catalyst component are known to cause reactor fouling due to unstable reaction conditions and/or uncontrolled deposition of polymer on the walls and other parts of the reactor.

Thus, because Reddy fails to disclose each limitation of claim 38, claim 38 is patentable in view of Reddy. Claims depending from claim 38, including claims 39-50 and 52-64, are also patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

Regarding new claim 64, which depends from claim 38 discussed above, claim 64 further requires the activation of the methylalumoxane-activatable compound by an activator prior to the contacting with the supported catalysts. The use of activators such as methylalumoxane in combination with metallocenes is well known in the art to greatly enhance olefin polymerization. These soluble catalysts are thought to have increased activity

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due to the complexation of methylalumoxane with the metallocene to generate an active, cationic metal center. The mixing of metallocene and alumoxane in solution, allows for the generation of this active, cationic center thereby activating the metallocene. Subsequent contact of this activated species with the supported catalyst, as claimed in claim 64, ensures that a quantity of *active* metallocene species is also present on the support. No such premixing or pre-activation is disclosed in Reddy.

Thus, because Reddy fails to disclose each limitation of claim 64, claim 64 is patentable over Reddy. Allowance of this claim is respectfully requested.

Regarding new claim 65, which depends from claim 38 discussed above, claim 65 further requires that the ratio of methylaluminoxane to metallocene used be less than or equal to 150. The catalyst system as disclosed by Reddy employs a ratio of methylaluminoxane to metallocene of about 3,555 (see Examples). One advantage of this supported, treated catalyst system over Reddy is that heterogenization of the metallocene complex allows a lower ratio of methylalumoxane to metallocene to be employed than is used in homogeneous systems. While ratios varying from 1,000 to 50,000 are commonly reported in literature, a dramatically lower ratio of less than 150 may be achieved by supporting the metallocenes. This is industrially advantageous as methylalumoxane is quite expensive, and use of a heterogeneous system as claimed by the applicant would significantly reduce costs because excessive amounts of methylalumoxane would not be necessary.

Thus, because Reddy fails to disclose each limitation of claim 65, claim 65 is patentable over Reddy. Allowance of this claim is respectfully requested.

Additionally, Applicant respectfully requests that the Attorney Docket Number be changed to 2003U043.US.

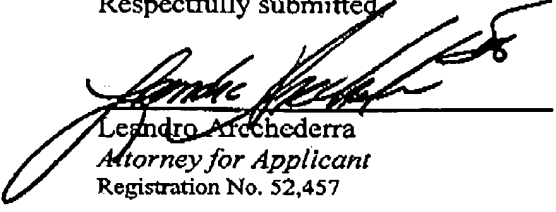
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Applicant believes this reply is fully responsive to all outstanding issues and places this application in condition for allowance. If this belief is incorrect, or other issues arise, the Examiner is encouraged to contact the undersigned at the telephone number listed below.

Respectfully submitted,

February 1, 2007

Date


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